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CLAIMS

1. A needleless injection device comprising
a cylinder (20) for medicament having an
injection nozzle at a forward end thereof and an
opening at its rearward end;
a piston (24, 25) sliding in the cylinder
through said open end, in use, to drive the
medicament through the nozzle;
a ram (61) to drive the piston into the
cylinder and having a longitudinal axis; and
an energy accumulator (77) to drive the ram
when discharged and disposed between the ram and a
discharge assembly (70), a rear end of the ram
extending into said discharge assembly; wherein
the discharge assembly (70) comprises a
retention member (75) fixed in the assembly, said
retention member having a plurality of retention
elements (76) spaced around and adapted to locate on
the ram (61) when in a charged position of the ram,
and a release ring (78) surrounding said retention
elements to prevent radial outward displacement
thereof and discharge of the ram; and wherein
axial displacement of said release ring (78)
releases said retention elements (76) and causes
discharge of the ram by said accumulator;
characterised in that said retention elements (76) are
integral with said retention member (75) and each has an
enlarged head (76A) which can move into and out of
engagement with a groove or recess (66) on the ram (61)
by deformation of the material of said retention member.

2. A device as claimed in claim 1 wherein said

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retention member comprises a collet (75) having radially-spreadable fingers (76), which collet in use moves between said first position in which said fingers engage with said ram (61) and said second position in which said fingers spread radially out of engagement with said ram.

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3. A device as claimed in claim 2 wherein said collet fingers are biased radially-inwardly.

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4. A device as claimed in claim 2 or claim 3 wherein said release ring comprises a collet lock sleeve (78) which limits outward radial movement of said collet fingers (76).

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5. A device as claimed in claim 4 wherein axial movement of said collet lock sleeve (78) is limited by abutment thereof against said collet fingers (76).

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6. A device as claimed in claim 4 or claim 5 wherein said collet lock sleeve (78) and said collet fingers (76) are respectively provided with cooperating tapered surfaces.

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7. A device as claimed in any of the preceding claims wherein said energy accumulator is a compression spring (77).

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8. A device as claimed in any of the preceding claims further comprising a nozzle lock assembly (30) which enables a nozzle to be releasably attached to said device upon insertion of a nozzle into an end

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thereof, the nozzle lock assembly including
on one of said nozzle or said end of the
injection device, a twist cap (31) containing a
moveable spacer (33) which has a non-circular
aperture therethrough; and

on the other of said nozzle or said end of the
injection device a protrusion (22A, 22B) having a
correspondingly shaped non-circular outer surface
which, if aligned therewith, can pass through said
non-circular aperture,

wherein, upon twisting of said twist cap (31),
the moveable spacer (33) twists with respect to said
protrusion so that the non-circular aperture of the
spacer can be selectively brought into and out of
alignment with the non-circular outer surface of
said protrusion, so that said protrusion (22A, 22B)
is respectively either free to move in or out of
said aperture or is trapped therein by said moveable
spacer (33).

9. A nozzle lock assembly as claimed in claim 8 wherein
said twist cap is located on said end of the
injection device and said protrusion is located on
said nozzle.

10. A nozzle lock assembly as claimed in claim 8 or
claim 9 further comprising a second protrusion
having the same non-circular outer surface and being
axially spaced from the first protrusion.

11. A nozzle lock assembly as claimed in any of claims 8
to 10 wherein said non-circular aperture and said
non-circular outer surface are substantially

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triangular.

5 12. A nozzle lock assembly as claimed in any of claims 8 to 11 further comprising a mark (34) on said twist cap which indicates the relative alignment of the non-circular aperture and the protrusion.

10 13. A needleless injection device as claimed in any of the preceding claims characterised in that said axial displacement is provided by means of a resistance-sensitive trigger comprising an axially-moveable shroud (90) forming at least part of the outer surface of said device, the trigger being activated by application of forward axial force to the shroud which is resisted by the skin of the patient at an injection site.

20 14. An injection device as claimed in claim 13 wherein said resistance-sensitive trigger (90) further comprises a safety-lock, moveable between a locked position, in which the device cannot be discharged and an unlocked position in which the device can be discharged.

25 15. A injection device as claimed in claim 14 wherein said safety lock comprises at least one axially-extending tab (94A, 94B) which serves as an endstop which, in said locked position, prevents axial movement of said shroud (90).

30 16. An injection device as claimed in claim 15 wherein said tab is driveable between said locked and said unlocked positions by a rotatable drive plate (92)

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actuated by a switch (54).

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17. An injection device as claimed in any of claims 14-16 wherein, in said unlocked position, said tab moves axially rearward to engage in a recess (97A, 97B) in an endcap (96) of the injection device.
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18. An injection device as claimed in claim 17 wherein said tab is rearwardly biased by means of a spring.
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19. An injection device as claimed in any of the preceding claims wherein said energy accumulator is a spring (77) confined within a variable-volume chamber, the injection device further comprising an integral firing force adjustment mechanism which, in use, varies the volume of said chamber, effected by rotation of said ram (61).
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20. An injection device as claimed in claim 19 wherein the rotation of the ram is effected by the turning of a key (17) inserted through one end of said device.
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21. A needleless injection device substantially as described herein with reference to any appropriate combination of the accompanying drawings.
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22. A discharge assembly, suitable for use in a needleless injection device as claimed in any of the preceding claims, comprising a retention member (75) fixed in the assembly, said retention member having a plurality of retention elements (76) spaced around and adapted to locate on a ram (61) when in a

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charged position of the ram, and a release ring (78) surrounding said retention elements to prevent radial outward displacement thereof and discharge of the ram; and wherein

5 axial displacement of said retention ring releases said retention elements and causes discharge of the ram by an energy accumulator (77);

10 characterised in that said retention elements (75) are integral with said retention member (76) and each has an enlarged head (76A) which can move into and out of engagement with a groove or recess (66) on said ram (61) by deformation of the material of said retention member.